APPENDIX 2. RECOMMENDED FORMAT FOR TSO-C127A INSTALLATION INSTRUCTIONS AND LIMITATIONS

1.0 Identification

(*Seat Manufacturer*) Model (xxxx) has been tested and certified to meet the requirements of TSO-C127a.

The following table gives the part numbers and the appropriate installation locations for each variation.

Part Number	Description
xxxxxx-x	*Forward facing, left-hand, single passenger seat w/inboard slide-down arm, tracking and swivel, adjustable headrest, recline and break-over back*
xxxxxx-x	
xxxxxx-x	
xxxxxx-x	

Technical assistance is available for questions regarding installation, operation, maintenance, or parts. Please contact Customer Service at either of the numbers listed below. Please be ready to give the seat model, part and serial numbers when you place the call.

Phone: xxx-xxx-xxxx
Fax: xxx-xxx-xxxx

2.0 Items That Affect Continued Airworthiness Requirements

The following items are components included in the definition of the TSO article. Their inclusion in this document is not as installation limitations, but as reference for the operator. Additional details regarding component assembly part numbers and hardware is provided in (*Seat Manufacturer*) Component Maintenance Manual CMM (*xx-xx-xx*).

2.1 Occupant Restraint System

Restraint P/N *(restraint P/N)*, manufactured by *(Restraint Manufacturer)*, must be installed on all passenger places in the orientation shown on the applicable envelope/installation drawing. Note the following:

a) (example: *State part of restraint P/N that indicates color, e.g., "The first two digits")* indicate the color of the webbing. The webbing color may be changed, but this requires approval by the TSO holder. The webbing material cannot be changed.

2.2 Cushions

Cushion P/N *(headrest, seat, back cushion or other applicable P/Ns)* must be installed on all seats. The cushions supplied with this seat are part of the approved TSO-C127a system

Refer to the (*Seat Manufacturer*) Customer Service (see Section 1.0) for the TSO holder's upholstery guidelines for specific instructions regarding modifications to the upholstery.

2.3 Replacement/Spare Parts

Continued TSO compliance of these seats can be ensured through the use of replacement or spare parts approved by *(Seat Manufacturer)* per CMM *(xx-xx-xx.)* or an applicable service document approved by the TSO holder. Modifications to the seats without the express written approval of *(Seat Manufacturer)* may void the TSO certification. This includes any physical modifications to cushions or dress covers.

Persons other than the TSO holder can make modifications to the TSO article in accordance with 14 CFR 21.611(c) and Advisory Circular (AC) 21-25A. Changes to seat restraint systems may require additional coordination with the TSO holder for that article.

3.0 Installation Limitations

The seat installer is solely responsible for establishing compliance of the seat installation for the required range of occupants. If a range of occupant sizes has been justified as part of the testing performed for the TSO approval, then it should be noted in this section.

3.1 Aircraft Attachments

This document defines the dynamic requirements for the seat to aircraft attachment. Static requirements must be handled separately.

Seats must be installed on *Airframe Manufacturer* seat track P/N XXXXX (*Supplier* P/N YYYYY), or seat tracks shown to be less critical with regard to seat fitting-to-seat track interface and seat track strength.

Or,

If the seats are installed on adapter plates or other attachments, the attachments must be capable of reacting the dynamic reaction loads given in the table below. The loads were measured during dynamic testing. (*example: X +Aft, Y +Right, Z +Up*)

Floor Attachment Reaction Loads

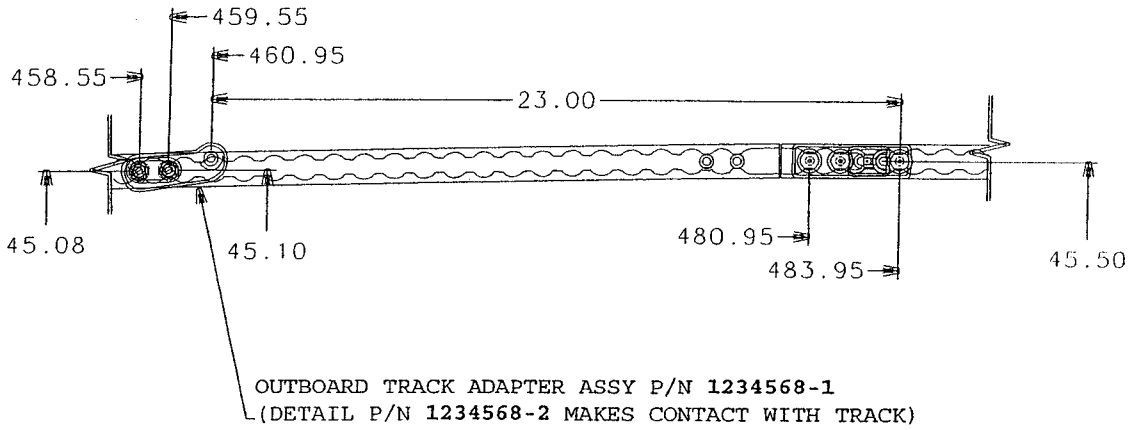
Leg	Direction	Vertical Test xxxxx Forward Facing Seat (lb)	Horizontal Test xxxxx Forward Facing Seat (lb)	Horizontal Test xxxxx Aft Facing Seat (lb)
LH Rear	X			
	Y			
	Z			
RH Rear	X			
	Y			
	Z			
LH Front	X			
	Y			
	Z			
RH Front	X			
	Y			
	Z			

3.2 Installation Orientation and Angle

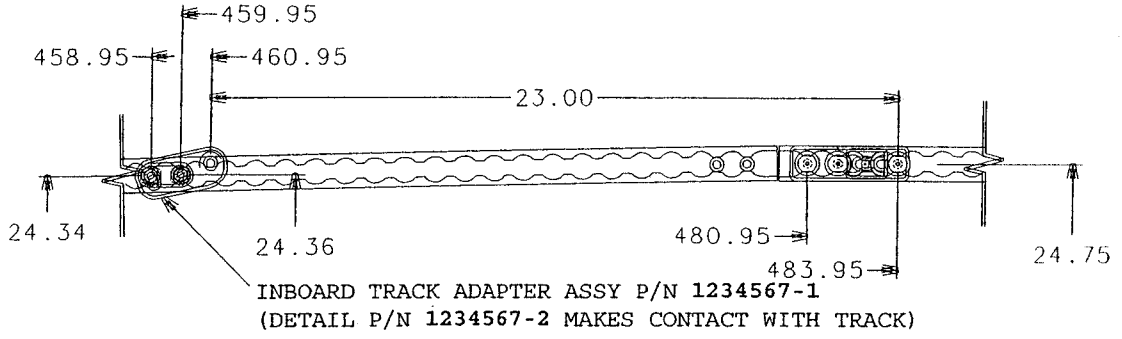
The seats must be installed at an angle no greater than (x°) from the longitudinal axis of the aircraft.

(*This section may provide a list of part numbers with the relevant angle.*)

Seat part number XXXXX must be installed on Model 737-600/-700/-800/-900 aircraft with the inboard front track adapter leg attachment located at LBL 24.75 and STA 460.95 and the outboard front track adapter leg attachment located at LBL 45.50 and STA 460.95.



NOTE: STATION AND BUTTLINE REFERENCE DIMENSIONS ARE CENTERLINE OF STUDS INSTALLED IN THE TRACK



3.3 Maximum Seat Weight

The maximum installed seat weight is the maximum allowable weight for the seat under the TSO with all components and includes all equipment the seat installer may add to the seat, such as emergency equipment or literature pocket contents.

Maximum Weight
(*example*)

Part Number	Maximum Certified Seat Weight (lb)[1]	Life Vest Weight			Literature Pocket Contents Weight		Console Pocket Contents (lb)		Maximum Installed Seat Weight (lb)[2]
		Qty per Location	*Weight per Location*	*Total Weight(lb)*	*Qty per Pocket*	*Total Weight(lb)*	*Qty per Pocket*	*Total Weight (lb)*	
xxx-0x	*xxx*	*y*	*y*	*xy*	*y*	*xy*	*y*	*xy*	*xxx*
xxx-01	*xxx*	*y*	*y*	*xy*	*y*	*xy*	*y*	*xy*	*xxx*
xxx-02	*xxx*	*y*	*y*	*xy*	*y*	*xy*	*y*	*xy*	*xxx*
xxx-03	*xxx*	*y*	*y*	*xy*	*y*	*xy*	*y*	*xy*	*xxx*
xxx-04	*xxx*	*y*	*y*	*xy*	*y*	*xy*	*y*	*xy*	*xxx*

[1] The maximum certified seat weight is the maximum substantiated weight for the seat with all items contained in the bill of materials installed, including IFE, occupant restraints, and dress covers. It does not include any equipment the seat installer may add to the seat, such as emergency equipment or literature pocket contents.

[2] The maximum installed seat weight is the maximum substantiated weight for the seat with all components and includes all equipment the seat installer may add to the seat, such as emergency equipment or literature pocket contents. This weight is equal to the minimum total tested seat weight of all static and dynamic tests used for substantiation of the subject seat P/Ns.

3.4 Seat Pitch and Head/Knee Excursions

(The example formats presented in this section cover both sections 3.4 and 3.5 of the main document.)

The seat installer must determine the requirements that are applicable for the aircraft in which the seat is to be installed and install the seat in accordance with the most critical limitation.

The following data defines the minimum required distances from other seats of the same model and maximum head/knee excursions. Two methods of presenting head/knee excursions are given (Method 1 – head/knee excursion figures and Method 2 – head/knee path data in tabular format).

NOTE: "This installation limitation is not applicable when the seat is installed in an aircraft that does not require compliance with FAR 25.562(c)(5) and FAR 25.562(c)(6)."

Seat Pitch / Head/Knee Excursion Limitations*(example)*

Seat Model No.	Seat P/N	Seat-to-Seat Pitch (in.) [1]								Maximum Excursions (in.) [2]	
		HIC [3] [7]		*Femur Load* [4] [8]		*Egress* [5]		*Life Vest Retrieval* [6]		Head [7]	Knee [8]
		Pitch	[9]	Pitch	[9]	Pitch	[9]	Pitch	[9]		
XYZ-123-A	1003188-001	56 [20]	[12]	56	[12]	N/A [13]	N/A	28	[14]	[10]	[11]
XYZ-123-B	1003188-002	56 [20]	[12]	56	[12]	N/A [13]	N/A	28	[14]	[10]	[11]
XYZ-123-C	1003188-003	29 to 42	[15]	29 to 42	[15]	30	[14]	28	[14]	50 [19]	50 [19]
XYZ-123-D	1003188-004	29 to 42	[16]	29 to 42	[16]	30	[14]	28	[14]	50 [19]	50 [19]
XYZ-123-E	1003188-005	29 to 42	[15]	29 to 42	[15]	32	[14]	28	[14]	50 [19]	50 [19]
XYZ-123-F	1003188-006	29 to 42	[16]	29 to 42	[16]	32	[14]	28	[14]	50 [19]	50 [19]
XYZ-123-G	1003189-001	30 to 38	[17]	30 to 38	[17]	30	[14]	28	[14]	50 [19]	50 [19]
XYZ-123-H	1003189-002	30 to 38	[18]	30 to 38	[18]	30	[14]	28	[14]	50 [19]	50 [19]

NOTES:

[1] Seat-to-Seat Pitch is measured centerline of front stud-to-centerline of forward front stud.

[2] Maximum excursions are measured from the centerline of front stud.

[3] Seat pitch(es) that the seat can be installed at for which HIC not exceeding 1000 has been demonstrated. The simplified procedures for head injury criteria (HIC) outlined in policy letter TAD-96-002 dated February 16, 1996 were utilized.

[4] Seat pitch(es) that the seat can be installed at for which Femur Load not exceeding 2250 lb has been demonstrated.

[5] Minimum seat pitch the seat can be installed at and still maintain a 6 inch clearance between seat rows with the critical deformations applied (reference AC 25.562-1A, Appendix 2, paragraph 2.a. and Figure 1).

[6] Minimum seat pitch the seat can be installed at for which life vest retrieval has been demonstrated for life vest P/N's XXXXX, YYYYY and ZZZZZ per the requirements of SAE AS8049A Subsection 3.1.20.

[7] This installation limitation is not applicable when the seat is installed in an aircraft that does not require compliance with FAR 25.562(c)(5).

[8] This installation limitation is not applicable when the seat is installed in an aircraft that does not require compliance with FAR 25.562(c)(6).

[9] Seat part numbers that may be installed forward of this seat at the pitch given.

[10] Seats installed behind an interior component or different model seat must be installed such that occupant head contact with interior/seat does not occur, or HIC does not exceed 1000 when considering the 50th percentile male ATD top of head path data given in Table Y.

[11] Seats installed behind an interior component or different model seat must be installed such that occupant knee contact with interior/seat does not occur, or Femur Load does not exceed 2250 lb. when considering the 50th percentile male ATD front of knee path data given in Table Z.

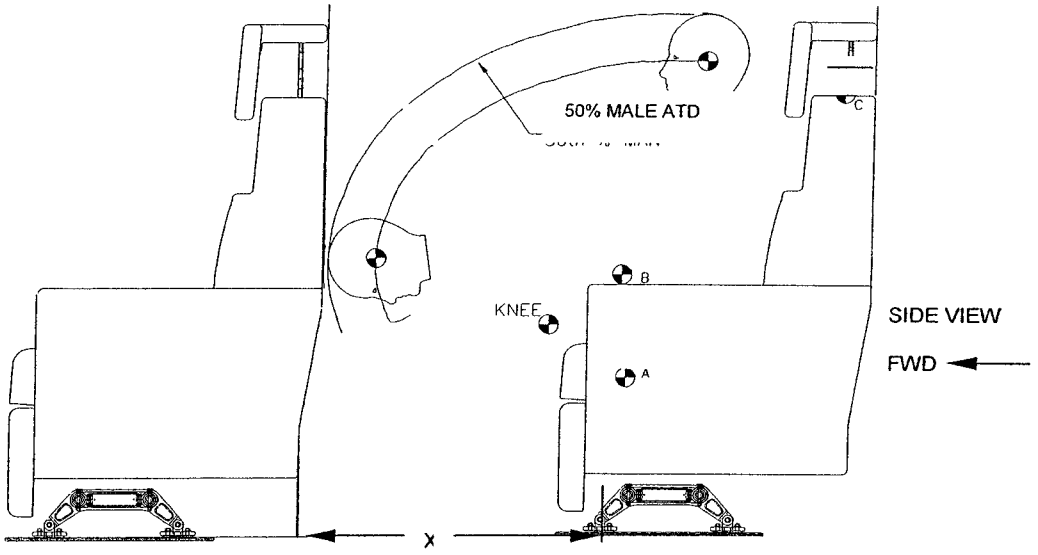
[12] Any seat. Seat pitch represents minimum pitch where an occupant would have no head or knee contact with a seat in front.

[13] Minimum seat pitch for maintaining 6 inch clearance with a seat in front has not been evaluated. See section 5.1 of this document for applicable seat permanent deformations that must be used for an installation approval.

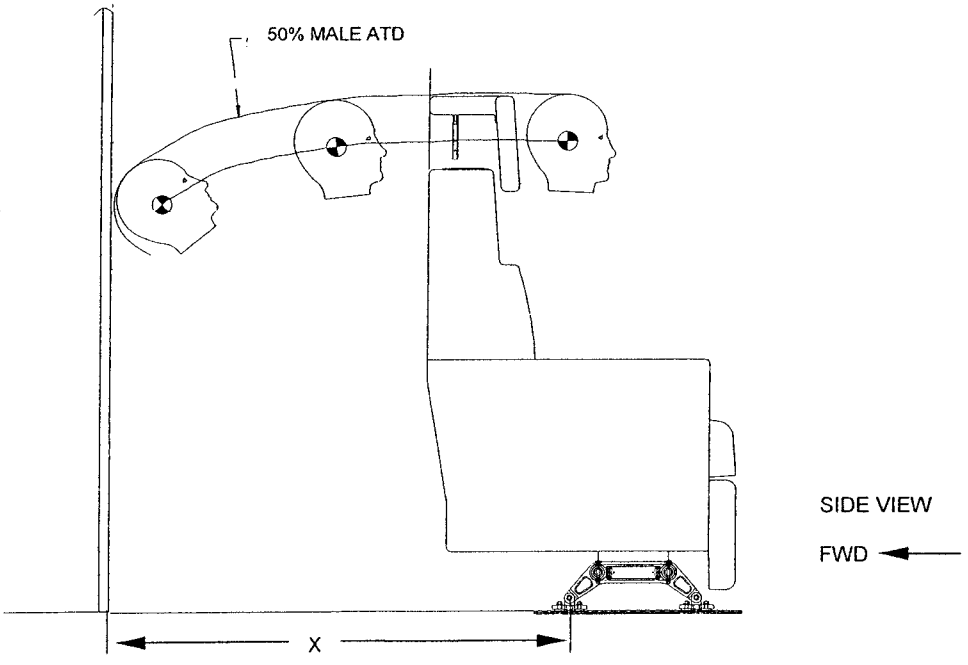
[14] All seat part numbers listed in Table X.
[15] P/N's 1003188-001, 1003188-003, 1003188-005.
[16] P/N's 1003188-002, 1003188-004, 1003188-006.
[17] P/N 1003188-005.
[18] P/N 1003188-006.
[19] Excursion given represents maximum excursion where and occupant would have no head or knee contact with an interior item in front.
[20] The seats have been shown to meet the requirements of SAE AS8049A Subsections 3.1.15, 3.1.18, 3.2.1, and 3.2.2 regardless of seat pitch.

Method 1

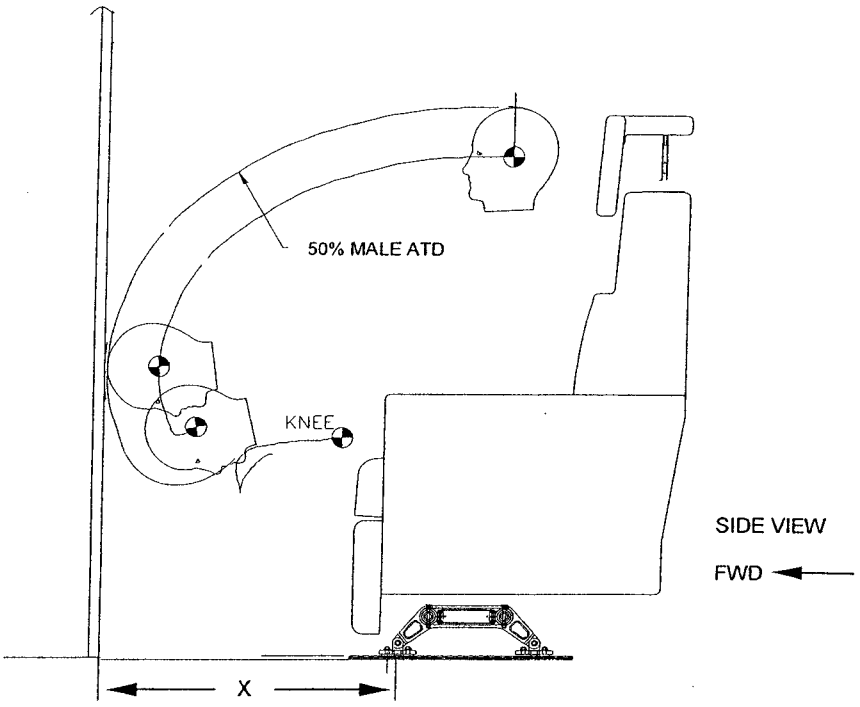
Maximum 50th Percentile Male ATD Head/Knee Excursion – Forward Facing, Row to Row



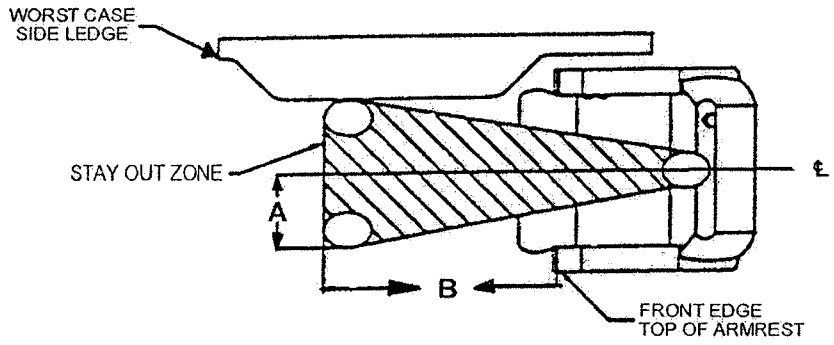
Maximum 50th Percentile Male ATD Head/Knee Excursion – Aft Facing, Seat to Monument



Maximum 50th Percentile Male ATD Head/Knee Excursion – Forward Facing, Seat to Monument



Maximum 50th Percentile Male ATD Head Excursion – Forward Facing, Seat to Monument, Plan View

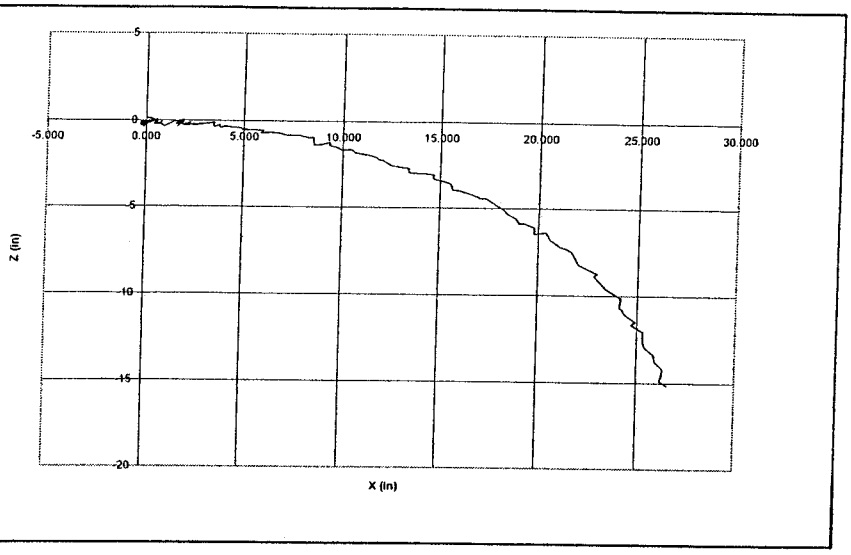


A = 10° either side of seat centerline

Method 2

50th Percentile Male ATD Top Head Path Data
(*example*)

Time	X	Z
(s)	(in)	(in)
0.00	x	z
0.01	x	z
0.02	x	z
0.03	x	z
0.04	x	z
0.05	x	z
0.06	x	z
0.07	x	z
0.08	x	z
0.09	x	z
0.10	x	z
(*etc.*)	x	z



4.0 Installation Instructions

4.1 Instructions

NOTE: "The conditions and tests required for TSO approval of this article are minimum performance standards. It is the responsibility of those desiring to install the article either on or within a specific type or class of aircraft to determine that the aircraft installation conditions are within the TSO standards. TSO articles must be approved for installation. The article may be installed only if the installation is performed in accordance with 14 CFR Part 43 or the applicable airworthiness requirements."

(example: commercial seat)

WARNING: DO NOT USE EXCESSIVE FORCE ON TRACK LOCK OR ANTI-RATTLE NUT AS IT MAY CAUSE BURRING OR WRENCHING. REMOVE ALL SHARP EDGES.

(1) Verify seat installation location using installation drawing. Pay particular attention to seats spanning track breaks at transition from constant section to non-constant section of aircraft, if applicable.

(2) Place track studs and track fittings at base of each leg assembly into corresponding openings in aircraft seat tracks. Ensure that seat is not racked with respect to aircraft seat tracks.

(3) Slide seat assembly forward or aft approximately one half inch until locking mechanism on track fitting can be pressed into seat track opening.

(4) To lock track fitting into position, use torque wrench to tighten Allen setscrew on top of fitting, which will push shear plunger against top surface of aircraft seat tracks. Be certain to apply torque specified on installation drawing to complete seat installation.

(5) Tighten anti-rattle nut or track adapter floor attachment bolts under forward portion of each leg to torque specified on installation drawing. If no torque is specified, tighten anti-rattle device by hand and then tighten additional ¼-turn using anti-rattle nut wrench.

(6) Verify seat is installed in correct location per installation drawing.

(7) If seat is equipped with in-seat electrical cabling, connect in-seat electrical cabling to aircraft seat-to-seat cables in accordance with aircraft electrical installation drawing.

(example: GA seat)

Clean floor tracks, studs, and track fittings prior to installing seats. This will prevent unwanted wear on fastener assemblies. To install seat assemblies in aircraft:

(1) Determine whether the seat is to be installed on the left-hand side or right-and side of the aircraft.

(2) Loosen knurled nuts (40076-10, 4 places) and nuts (AN316-6R, 4 places) on mounting studs (331281-28, 4 places; see configuration drawing for identification of part numbers in individual positions).

(3) Lower seat onto floor track so that mounting studs fit through cutouts in floor tracks.

(4) Slide seat forward or aft into final position

(5) Tighten nuts (AN316-6R, 4 places) to 50 ft lbs torque.

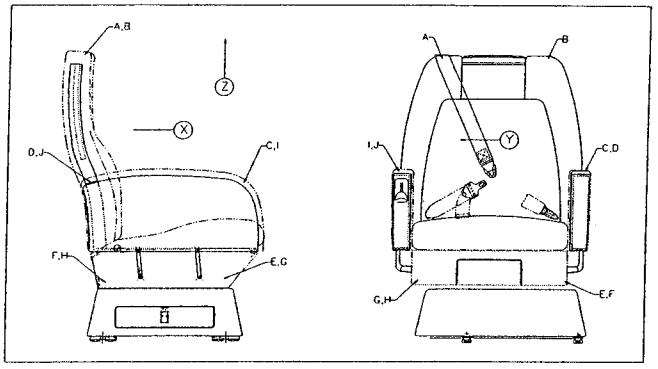
5.0 Data That May Be Used By The Installer In Approving An Installation

The following data has been included in the TSO data package and may be used by the installer for the purpose of installation approval:

5.1 Seat Permanent Deformations

The following tables show permanent deformations measured during testing. Measurements are given in millimeters. Reference figures below for location markers and direction.

Seat Orientation and Location Markers



Deformations
(*example*)

Target	Location	Direction	Pre-Test	Post-Test	Deformation
A	(*description*)	X	x	y	y-x
		Y	x	y	y-x
		Z	x	y	y-x
B	(*description*	X	x	y	y-x
		Y	x	y	y-x
		Z	x	y	y-x
C	(*etc.*)	X	x	y	y-x
		Y	x	y	y-x
		Z	x	y	y-x

5.2 Specific Installation Testing

This section provides supplementary information for specific installation testing. Items considered for specific installation testing are provided in (*document ABC*).

(*list of relevant part numbers, set-up figure, statement of results*)

5.3 *Non-TSO Approved Items That May Be Installed On The Seat*

The table below lists the only items approved for installation on these seats with respect to mass, CG, and retention under static and dynamic conditions. All items must be reviewed by the installer per *(cert. plan or similar agreement)* for compliance with other requirements. Installations that deviate from the envelope drawing require approval by the TSO holder.

Part Number	Description	Attributes Accounted for in the Seat TSO Authorization				
		Mass	CG	Retention	Flammability	Environmental
ABC-123-1	Electronic Control Unit	Y	Y	Y	Y[1]	N
ABC-123-2	Pneumatic Lumbar System	Y	Y	Y	Y[1]	N
ABC-123-3	Seatpan Actuator	Y	Y	Y	Y[1]	N
ABC-123-4	Legrest Actuator	Y	Y	Y	Y[1]	N
ABC-123-5	Recline Actuator	Y	Y	Y	Y[1]	N
ABC-123-6	Footrest Actuator	Y	Y	Y	Y[1]	N
ABC-123-7	Seat Actuation PCU	Y	Y	Y	Y[1]	N
1111-11	Reading Light	Y	Y	Y	N	N
1234-11	Harness - LH Double RH Pax	Y	Y	Y	N	N
1234-21	Harness - LH Double LH Pax	Y	Y	Y	N	N
1235-11	Harness - CTR Triple LH Pax	Y	Y	Y	N	N
1235-21	Harness - CTR Triple Ctr Pax	Y	Y	Y	N	N
1235-31	Harness - CTR Triple RH Pax	Y	Y	Y	N	N
1236-11	Harness - RH Double RH Pax	Y	Y	Y	N	N
1236-21	Harness - RH Double LH Pax	Y	Y	Y	N	N
123456-11	Harness, Prox. Light-Prox Light Disc	Y	Y	Y	N	N
123456-1	Aisle Light, Clear	Y	Y	Y	N	N
RD-AA1234-01	Digital Seat Electronics Box (DSEB)	Y	Y	Y	N	N
RD-AA1235-05	Digital Seat Electronics Box (DSEB)	Y	Y	Y	N	N
RD-AA1236-05	Digital Seat Electronics Box (DSEB)	Y	Y	Y	N	N
RD-AA2222-10	Cradle	Y	Y	Y	N	N
RD-AA7553-52	LCD Monitor, 9"	Y	Y	Y	N	N
RD-AA7753-52	LCD Monitor, 10.4"	Y	Y	Y	N	N
RD-AM9999-84	Harness, J6-Feed Forward	Y	Y	Y	N	N
RD-AM9826-21	Harness, J7-Console	Y	Y	Y	N	N
RD-AM9887-31	Harness, 9" SDU	Y	Y	Y	N	N
RD-AM9886-32	Harness, 9" SDU	Y	Y	Y	N	N
RD-AM8804-47	Harness, Feed Forward-SDUs	Y	Y	Y	N	N
RD-AM8803-53	Harness, Feed Forward-SDUs	Y	Y	Y	N	N
RD-AM4341-01	Magnet	Y	Y	Y	N	N
RD-AX6346-24	Remote Jack Unit (RJU)	Y	Y	Y	N	N
Z270H3208888	In-Seat Power Harness – ACOU - Console Disconnect	Y	Y	Y	N	N
ATB01-12/570	In-Seat Power Harness - Ground1	Y	Y	Y	N	N

[1] The only aspect of flammability covered under the seat TSO for this item is 12-second vertical burn per 14 CFR 25.853(a), Appendix F, Part I. Harness pigtail not included.